CENTRAL INTELLIGENCE AGENCY

CLASSIFICATION SECRET 25X1

SECURITY INFORMATION

INFORMATION REPORT

REPORT NO.

CD NO.

COUNTRY USSR (Moscow Oblast)

DATE DISTR. 8 August 1952

25X1 SUBJECT Work of the Insulation Coating Laboratory, 25X1 Institute [ ] Fryazino

NO. OF PAGES 4

NO. OF ENCLS. (LISTED BELOW) 3

SUPPLEMENT TO REPORT NO. 25X1

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THIS IS UNEVALUATED INFORMATION

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25X1 2. [ ] at Institute [ ] in 1946 [ ] the Soviets sprayed filaments with a spray gun. The solution they used was an RCA formula, taken from a large 25X1 25X1 thick book; the issue [ ] was dated 1942. The RCA Company, USA, had forwarded copies to this plant. (In addition to the RCA book, [ ] another book used as a guide which had been requisitioned when the Soviets took over the Tungsram Tube Mfg. Co. in Budapest, Hungary. Both books were written in English. [ ] 25X1 [ ] The solution used by the Soviets for the spray gun process consisted of aluminum oxide, nitro-cellulose, and amyl acetate. This process was discontinued because the spray gun wasted too much paste, was uneven in application, and was too costly.

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25X1

3. a catapheratic process for applying aluminum oxide onto filaments Method #1) Method #1 was finally adopted by the Soviets in April 1952. This process was used by Telefunken's various plants, it very efficient. It was a simple process, coating the filaments evenly and inexpensively. the various types of filaments which were coated /see Enclosure (A), Sketch No 1/. The following is a description of Method No 1:

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a. Equipment /see Enclosure (A), Sketch No 2/:

Filaments were lowered into a tank containing a solution of aluminum oxide, methyl-alcohol and nitro-cellulose (the latter acts as an adhesive--1.5 grams to 120 cubic centimeters of liquid). The formula for this solution is as follows: 100 grams of aluminum oxide, 120 cubic centimeters of methyl alcohol liquid, and 35 cubic centimeters of nitro-cellulose dissolved in a solution of amyl acetate (6 grams in 100 cubic centimeters) (amyl acetate, is the Russian and German commercial designation). A propeller driven by an electric motor mechanically agitates the solution during the plating process. The voltage used for this process depends upon the size of the filament and the thickness of the coating of aluminum oxide desired. The voltage varies accordingly between 20 and 100 V DC. A spring clamp, permanently attached to a rotatable carousel at the base of a vertical steel rod, holds the filament.

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b. Procedure:

A girl would place the filaments in the clamps. (The number of filaments dipped at one time varied in number from 1 to 10.) Another girl dipped the filaments into the vat for from 1 to 5 seconds depending on the thickness of the coating to be applied (thickness varied anywhere between 30 and 80 microns). After dipping, the filaments were dried. Three drying methods were used: (a) air dried--at ambient temperature, (b) oven dried, or (c) fan dried--warm air was circulated in and around the filament by means of an electric fan. When dry, a girl would remove the filaments and place them in thick cardboard boxes, making sure that sheets of paper separated each layer of filaments.

c. Disposition:

One of the girls would carry the boxes containing the small "spiral spiral" filaments /see Enclosure (A), Sketch #1/ to the magnetron department, the flat "hairpin" filaments to the Receiver Department, and the large "spiral" filaments to the Thyratron Department. the latter type was used with very high current since the thickness of the wire varied between 0.3 and 1 millimeter--the current at 1 mm was probably 30 amps.) Although the "spiral u" and "spiral hairpin" filaments normally varied in length from 15 to 40 millimeters, approximately six samples in 1949 which were 80 to 90 millimeters long. These were apparently considered especially secret, as the engineer who hand-carried them would not leave them; and, if any were broken, he collected the pieces.

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25X1 These filaments were, used in a transmitting tube or perhaps in an impulse tube. 25X1 25X1

25X1 a crack at the apex of the filament due to the poor material used, not the coating material. This cracking occurred when the filament was accidentally shaken.

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4. [redacted] a sketch [see Enclosure (B), Sketch #1] of a smearing process used by the Soviets at Institute [redacted] for applying insulation pastes (aluminum oxide) onto filament wire. [redacted] [redacted] [redacted] The Soviets called this process "the American method". [redacted] they obtained this machine via lend lease. It was new and of RCA manufacture. [redacted] the solution used in the machine from a formula of aluminum oxide, water, and aluminum nitrate [redacted] from the RCA book. [redacted] The trouble with this process appeared during the final stage when the filament taken from the spool was shaped (by hand, over a form for the hairpin shaped filaments--by machine for the spiral shaped filaments). During this bending the coating would crack and peel off; consequently, it was necessary to recoat the filament. [redacted] the technique employed was similar to German and American methods. The Soviets had been unable to obtain satisfactory performance with this method and had adopted the "spray method". [See para 2 above.] Neither the Soviets [redacted] could resolve the deficiencies of the "American method" and thus this technique along with the machinery was abandoned.

5. The next process [redacted] in 1947 was a cataphoratic process for applying carbonates onto filament wire. [redacted] Method No 2 [see Enclosure (B), Sketch No 2]. This device, manufactured in approximately 1939, was older than, but almost identical to, a machine [redacted] in Telefunken Co, Berlin. It coated the wire continuously, whereas the newer type Telefunken machine coated only certain portions as necessary (to allow for bending). The formulas employed were originally used by Telefunken, Berlin. [redacted] the spools of wire to be coated came from Moscow. [redacted] the orders were filled promptly (within 24 hours after the submission of a request). It was of very poor quality; any German company would reject approximately 75% as unfit for use. After the coating had been applied, girls would pick up the finished spools and take them to another department for shaping.

6. [redacted] a cataphoratic process for applying zirconium onto anodes and grids. [redacted] this process to blacken these surfaces Method No 3 [see Enclosure (C), Sketch No 1]. A mixture of graphite and nickel was applied in the manner shown to blacken the surfaces of anodes and sometimes grids for the purpose of increasing the radiation. The anodes to be blackened were 45 mm high x 30 mm in diameter; this was the largest size submitted [redacted]

7. The Soviets brought a device from OSW in Berlin for cathode diffraction [perhaps diffusing] [redacted] It was manufactured by a company in Leipzig which also sold some to Telefunken. [redacted] This cathode diffusion process (not a cataphoratic process) was used to coat insulating materials with silver, gold, or platinum using a vacuum tank [see Enclosure (C), Sketch No 2]. The material to be coated, usually quartz, ceramics (Pertinax), or other similar insulating materials, is hung between vertical suspended wires. Prior to coating, air was evacuated from the tank and hydrogen was injected up to a pressure of approximately 1/10 millimeter . (This pressure was dependent upon the material to be coated.) The hanging wires were usually silver (contact material) and platinum (for resistance material). Gold was not used as often. The voltage impressed for a silver coating varied from 1/2 minute to 20 minutes depending on the thickness desired. For example, if a silver coating of 10-20 millimicrons was required, then only 1/2 minute was necessary. The voltage was then sent through to the other iron pole and the process repeated; thus an even coating of silver was attained. The hydrogen pressure forced into the tank affects the number of ions produced which go on the wires. This heats the wires,

[redacted] 25X1

and, once heated, an additional ion will propel an atom of metal onto the material to be coated. The advantage of this method is that a large surface can be coated evenly. The various materials to be coated were first cut to proper size. If this was not done first, the coating would be wiped off when cut. The resistors which were coated were low self-capacitance and induction free; thus, the noise produced due to the Brownian movement of the electron in the resistor produced by this method was very low because of this process of providing an even coating. [redacted] 25X1

25X1 [redacted]

25X1 8. In late 1951, [redacted] approximately 100 samples of spiral filaments, which included some 20 different types. The vacuum tubes these samples were made for were considered secret. [redacted] 25X1

25X1 [redacted] 25X1 the spiral filaments were used in magnetrons, [redacted] 25X1

25X1 [redacted]

25X1 9. It should be noted that [redacted] efforts at Institute [redacted] were used experimentally. [redacted] 25X1

25X1 [redacted] the sample machines used were copied by the Institute's Machine Shop. These copies were retained in their stock.

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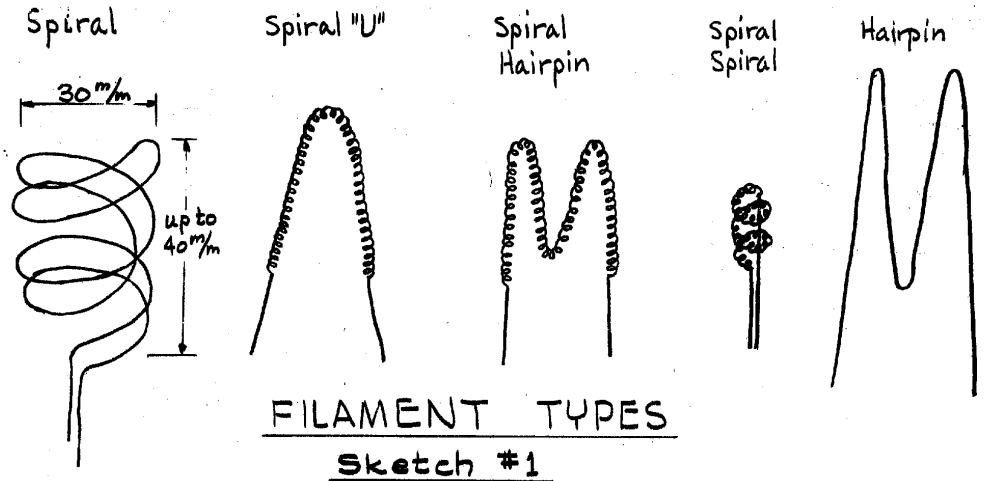
25X1 [redacted] producing for research and development and not for production.

ENCLOSURE (A) Sketch 1--Filament Types
Sketch 2--Cataphoratic Process for Applying Aluminum Oxide on Filaments - Method No 1

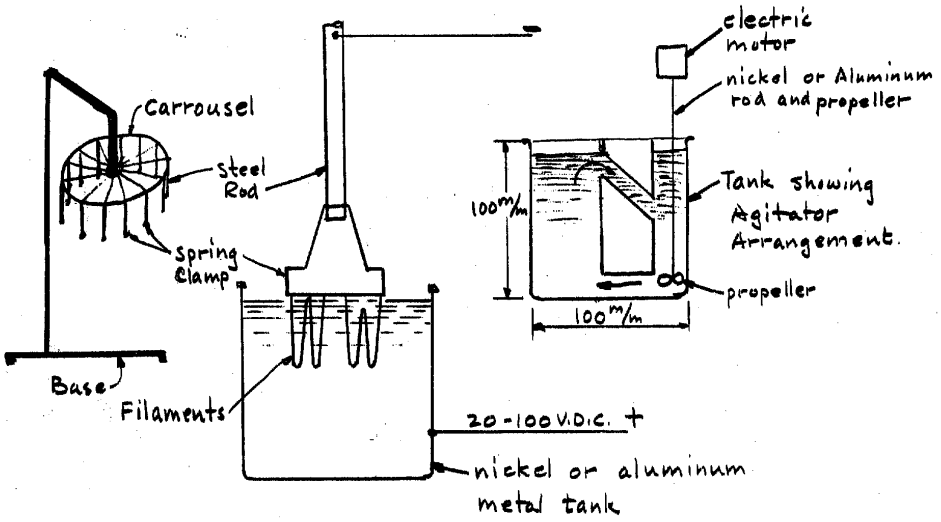
ENCLOSURE (B) Sketch 1--Smearing Process for Applying Insulation Paste (Aluminum Oxide) on Wire
Sketch 2--Cataphoratic Process for Applying Carbonates on Wire - Method No 2

ENCLOSURE (C) Sketch 1--Cataphoratic Process for Applying Zirconium onto the Anode - Method No 3
Sketch 2--Cathode Diffusion Process for Coating Material



FILAMENT TYPES

Sketch #1



CATAPHORATIC PROCESS for APPLYING Aluminum Oxide on Filaments - Method Nº 1

Sketch #2

Enclosure (A)

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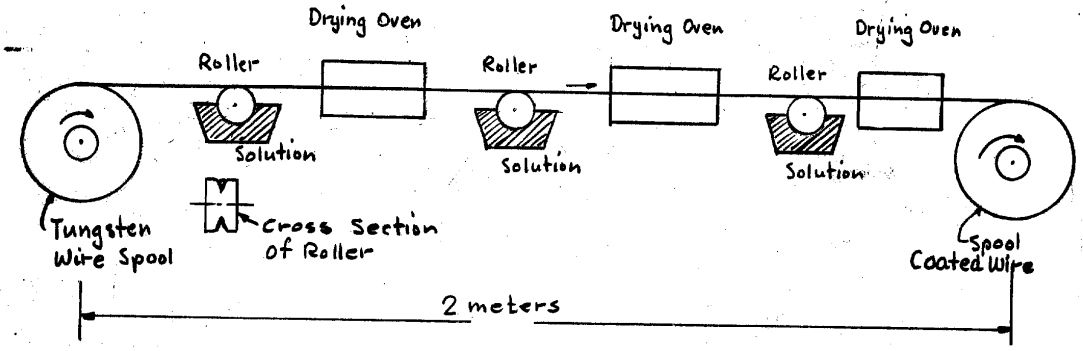
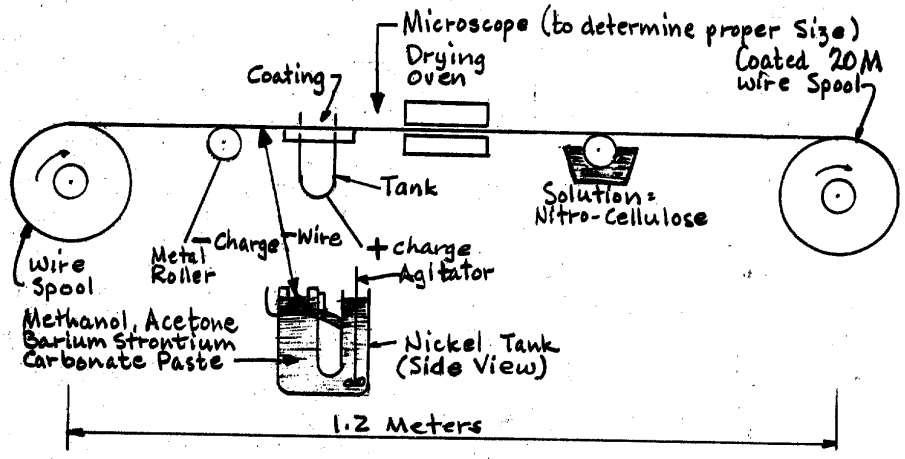


Smearing Process for applying Insulation Paste (Aluminum Oxide) on wire

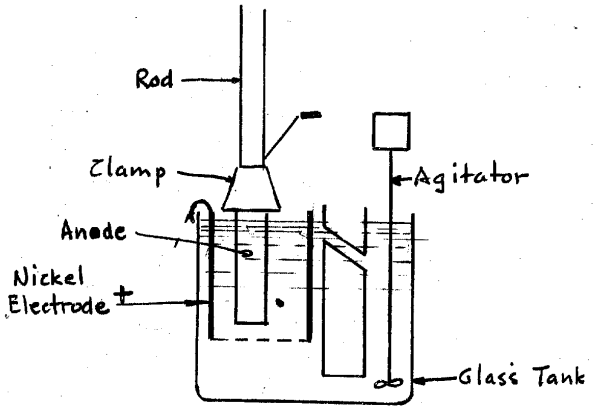
Sketch #1



CATAPHORATIC Process for Applying Carbonates on Wire - Method №2

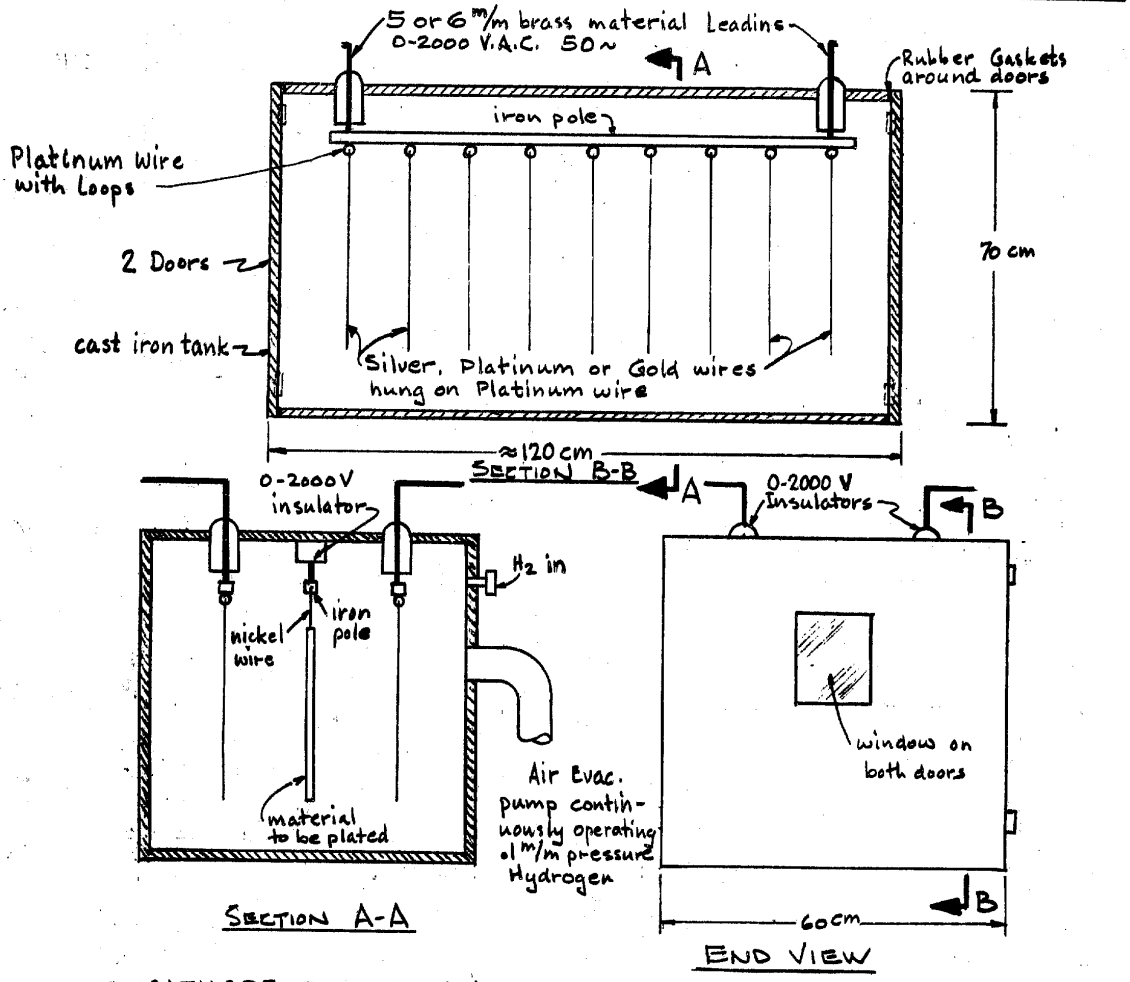
Sketch #2

Enclosure (B)



CATAPHORATIC Process for applying Zirconium onto the Anode - Method № 3

Sketch #1



CATHODE DIFFUSION Process for Coating Material

Sketch #2

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Enclosure (C)